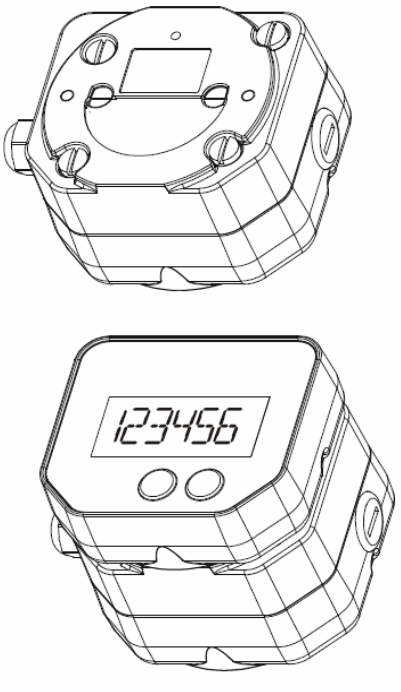
® Badger Meter Europa GmbH

MN-MR150



USER MANUAL

May 2006

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1. Basic safety recommendations

The manufacturer is not liable for damages that result from improper or not in accordance with the requirements use. The meters are constructed according to state-of-the-art technology and tested operationally reliable. They have left the factory in a faultless condition concerning safety regulations. The mounting, electric installation, taking into operation and maintenance of the meter may only be carried out by suitable technicians. Furthermore the operating personnel has to be trained by the operating authority and the instructions of this manual have to be followed. Basically, you have to respect the regulations for the opening and repairing of electrical equipment valid in your country.

Repairs

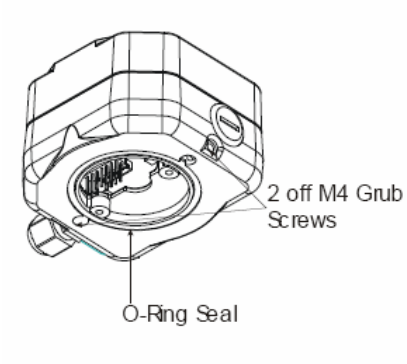
Should you send back a flow meter in operation, please take notice of the following points:

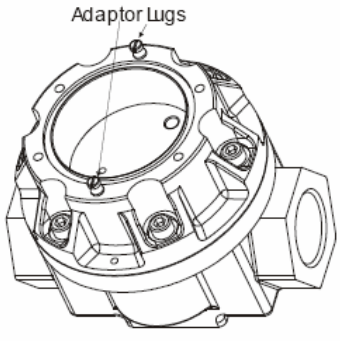
- Please enclose a description of the error as well as a precise statement of the measured medium (if necessary a safety specification sheet).
- The meter has to be in a cleaned condition (outside and inside). Especially with harmful measuring mediums you have to pay attention that there are no impurities nor residues in the pipe or at the connections.
- If it is not possible to clean the meter completely, particularly with harmful materials, do not send back the meter.
- Please copy and fill in the harmless declaration at the end of this manual and send it back together with the meter to be repaired.

  We reserve the right to repair only cleaned meters. Costs, which result from insufficient cleaning, will be charged to you.

2. Mounting and access

The MNR150 mounts on to the meters using two grub screws and two mounting lugs. An o ring seal is fitted on the bottom face of the module for sealing to the meter. The mounting lugs can be mounted in two positions on the meter body allowing the module to be orientated at 90 degree increments with respect to the meter.





3. Electrical connections

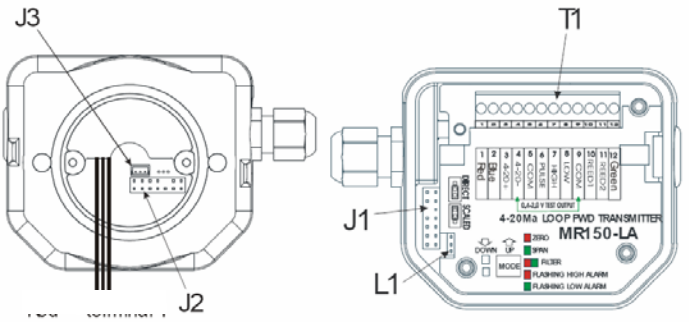
3.1 Cable entry

Two M12x1.5 holes provide for cable entry via a standard M12 cable gland.

3.2 Electrical connections

There are 4 electrical connectors and one jumper link.

T1	Terminal strip 12 screw terminal 3,5 mm pitch	Top
J1	Top inter-module connector 14 pin 0,1" header	Top
J2	Bottom inter-module connector 14 pin 0,1" pitch header	Bottom
J3	Meter input connector 1,5mm pitch 3 pin header	Bottom
L1	Pulse output selector link	Top



red = terminal 1
blue = terminal 2
green = terminal 12

3.3 Connections

Terminal T1

Terminal		
1	Reed / Hall + VDC	
2	Reed / Hall signal	
3	4-20mA + Ve	
4	4-20Ma - Ve	0,4 - 2,0 V test
5	Output common	
6	Scaled pulse out	
7	High flow alarm	
8	Low flow alarm	
9	Pulse in common	04 - 2,0 V test
10	Pulse in (reed)	
11	Spare	
12	Hall 0V (-Neg)	

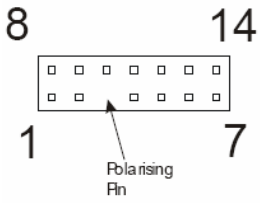
Note: For meters with additional pulse transmitter 1 & 2 on terminal T1 has been assigned for the reed type and 1, 2 & 12 for hall sensor.

3.4 Jumper J1 & J2

Inter-module headers.

Note pins marked NA are for factory programming and testing.

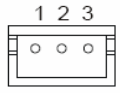
Pin	Description	Pin	Description
1	VBAT	8	VDD
2	GROUND	9	NA
3	Polarizing pin	10	+3V
4	PULSE IN	11	NA
5	NA	12	NOT CONNECTED
6	NA	13	NA
7	NA	14	NA



3.5 Jumper J3

Pulse input header. Note header is polarised.

Pin	Description
1	VDD
2	PULSE IN
3	GND



3.6 Link L1

Link L1selects the signal connection to pin 4 off jumper J1, either a direct pulse from the flow meter or a scaled pulse from the MNR150 can be selected.

In direct position the pulse input from the meter is connected to pin 4. in this arrangement when MNR100 is connected to the MNR150 via Jumper J1 the MR100 will work independent of the MR150 module and will count flow rate when no power is supplied to the MNR150. The K factor for the MNR100 must be set to the K factor for the flow meter.

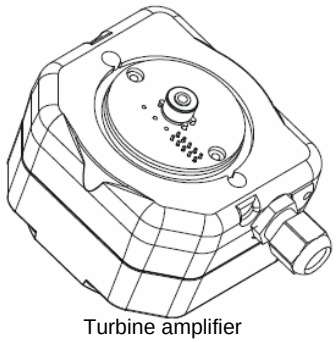
In scaled position the scaled pulse out from the MNR150LA is connected to pin 4 of jumper 1 and 2. In this arrangement an MNR100 connected to the MNR150 module via Jumper J1 will receive the scale pulse output from the MNR150LA. If the MNR150 has no power no pulse will be received via pin 4. The K factor for the MNR100 must be set to match the scaled pulse output.

4. Pulse input

The pulse input MUST be electrically isolated from ground. Failure to do so will result in a ground loop that can cause faulty operation of the module.

Typical reed switches are used for positive displacement type meters.

A low power inductive sensor module TM050A is available for Turbine meters. This connects via Jumper J2.


Turbine amplifier

Sensors such as hall switches cannot be powered directly from the Module due to the limited current capacity of the loop. Where Hall switches are require the MNR150EA external powered module must be used, or the output from the hall isolated using an opto isolator or similar circuit.

4 options for pulse input are

- Connections via terminal T1
  A reed switch can be connected via terminals 9 and 10 on terminal T1.
- Turbine amplifier
  Fitting a TM050B allows the module to be mounted on any turbine meter.

- 4-20mA connection
The module is loop powered and requires a minimum 16V to operate. Maximum voltage is 30VDC. The power supply voltage must be adequate to ensure reliable operation of the module. The actual power supply voltage depends on the requirements of other components in the current loop.

- Auxiliary outputs
Three additional outputs are provided:

- Scaled pulse
- High flow rate alarm
- Low flow rate alarm

Outputs are optically isolated solid state relays maximum current is 100mA per output.

5. Programming and customising

The transmitter uses a microcontroller. Settings are stored in an on board eeprom. These settings can be changed to customise the transmitter in two ways

1. Field programming using on board 3 button keypad. This allows adjustment of all key parameters in the field without the need for any external programmer.

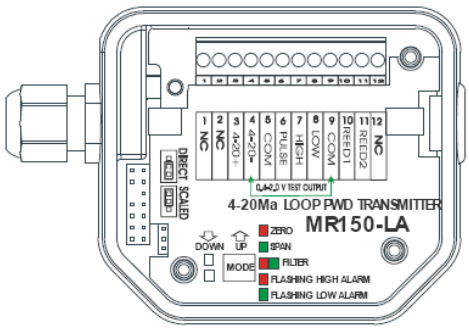
2. Programming using a PC and an RS232 serial interface via MNR120 Programming adaptor and programming software. This allows all Parameters to be adjusted. Typically this is done in the factory before installation. However it can be done in the field using a Lap top PC.

NOTE: The field adjustments should only be used for trimming adjustments to settings. The module must be programmed via a PC with settings for the meter it is to be fitted to.

5.1 Field programming

The module has a 3 button keypad, a green and red LED and a 0.4-2.0V output to allow field adjustment of all key parameters. Both the factory and the field adjusted settings are stored in eeprom allowing the module to be returned to the factory setting at any time.

NOTE: When using field adjustments the 4-20mA output may change to refect the parameter being adjusted. (i.e High alarm setting). Care should be taken to ensure that this does not effect any instrumentation or equipment connected to the transmitter.



5.2 Field adjustments

5.2.1 Local 0,4 - 2,0V output

A local voltage output that follows the 4-20ma loop powered signal is provided between terminals 4 and 9 this allows local monitoring and adjustment of the output signal without the need to break the current loop.

5.2.2 Basic programming

Zero, span, filter, high flow alarm and low flow alarm can be easily adjusted in the field without breaking the current loop using a multimeter to monitor the settings. Filter adjusts the transmitter's sensitivity to fluctuations in flow rate.

Push the mode button to step through the six modes, below. When editing, hold the mode button down for 5 seconds to restore the setting to its factory default value.

Use the Up and Down buttons to edit the setting for the mode. (They will auto-repeat if you hold them down and their effect accelerates every few seconds.)

Mode	Red LED	Green LED	Current output	Short cuts
Normal	Off	Off	Rate	None
Zero adjust	On	Off	Adjust 4 to suit the rate	R-Up = Rate, R-Down =0
Span adjust	Off	On	Adjust to suit the rate	R-Up = Rate
Filter adjust	On	On	Rate	None
High flow alarm	Flashing	Off	High alarm setting	R-Up = Rate, R-Down = Off
Low flow alarm	Off	Flashing	Low alarm setting	R-Up = Rate, R-Down = Off

5.2.3 Setting values to match flow through meter

Zero span and alarms can be set to match the flow through the meter. This is useful where the desired flow rate can be easily adjusted.

5.2.4 Procedure

1. Adjust the flow through the meter to match the desired setting.
2. Select the parameter to be adjusted using the mode button (ie zero - red LED on)
3. Press and hold mode then press up button for 5 seconds. The value is set to the current flow rate.

6. D/A converter calibration

A digital to analogue converter is used to generate the 4-20mA signal. This is factory calibrated and should not normally required adjustment. If necessary the D/A can be calibrated in the field.

Note: If this is done the output will also change and other settings may need to be adjusted.

Procedure

Press Reset until you get to the mode with both LEDs On (Filter Adjust mode) then press the Up & Down buttons at exactly the same time. (This can take a few attempts to get right. Once successful, the two LEDs will flash on and off quickly, out of phase.) You then have 10 seconds to return to Normal mode (both LEDs off) and to press Reset again: you will then be in the first factory mode.

Factory mode	Red LED	Green LED	Current output	Short-cuts
Set 4mA	Flashing fast	Off	Sets the 4mA output level	R-Up or R-Down= 0
Set 20mA	Off	Flashing fast	Sets the 20mA output level	R-Up or R-Down = Max.

7. Factory programming

The transmitter can be connected to a PC via an RS232 serial interface using (MNR120 programming adaptor. A software programm (MN125) allows interrogation of the transmitter and adjustment of all operating parameters.

Note: The transmitter must be disconnected from the 4-20mA current loop and pulse input while programming.

8. Model number system

PART NUMBER					
Base Model	**Power source**	**Fitting**	**Display**		**Size**
MR150	E	M	D	-	00
	L	R	G		01
		W	E		04
			N		07
					10

Code	**Description**
E	External powered
L	Loop Powered
M	Meter Mount
R	Retrofit
W	Wall mount
D	MR100
E	Standard or Deluxe Display
N	No display
00	Required for Remote units
01	M05 / M1 / M2
04	MF
07	M7
10	M6 / M100

9. Return of goods for repair

Please copy, fill in and sign hereafter harmlessness declaration and enclose it for any return of goods you may send back for repair.

No repair will be performed prior to receiving the harmlessness declaration duly filled and signed.

Harmless declaration

To : _____

Attn. : _____

From : _____

Dept. : _____

Please note that no repair will be performed prior to receiving of this declaration duly singed by you!

Please send all parts clean from medium and inform us about possible medium wastes remaining in the part. For this purpose, please use this form. A security specification sheet of the medium must accompany this declaration in the following cases: Toxical, dangerous or objectionable media, or media belonging to any dangerous materials class. We inform you that uncleaned parts lead to additional costs. Extra clean costs will be charged to you. Furthermore, we reserve us the right to send the parts back to you for cleaning!

Declaration

We herewith confirm that the part(s) sent for repair has/have been cleaned and is/are free of any liquid and/or solid wastes of the medium and/or cleaning medium: Any eventually remaining wastes are:

❍ harmless

❍ dangerous, toxic, etc. – Security specifications are attached

Signature of person in charge: _____

Name of the person in charge in capital letters: _____

Date: _____

Company stamp: _____

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